

REMARKS

Initially, applicants respectfully request that the enclosed Further Declaration be entered, notwithstanding finality of the Office Action mailed July 21, 2003. In this regard, and as will be discussed further *intra*, the enclosed Further Declaration has been submitted in light of contentions made by the Examiner in Item 10, bridging pages 5 and 6 of the Office Action mailed July 21, 2003, with respect to the previously submitted Declaration Under 37 CFR §1.132 (submitted with the Amendment filed June 30, 2003). Accordingly, it is respectfully submitted that the presently filed Further Declaration is timely. Particularly since the enclosed Further Declaration responds to arguments by the Examiner in the Final Rejection, entry is proper.

Reconsideration and withdrawal of the rejection under 35 USC §103, as set forth in Item 3 on page 2 of the Office Action mailed July 21, 2003, is respectfully requested. It is respectfully submitted that the presently filed Further Declaration, particularly in combination with the aforementioned previously filed Declaration, clearly establish unexpectedly better results achieved according to the present invention as compared with the teachings of Tanimoto, et al., so as to overcome any possible *prima facie* case of obviousness established by the teachings of Tanimoto, et al., and establish unobviousness of the presently claimed subject matter.

In particular, attention is directed to the enclosed Further Declaration, and in particular, the experimentation described in Items 3-9 on pages 1-5 of this Further Declaration. This experimentation includes testing of a specimen as in Example 44 in Table 3 of U.S. Pat. No. 6,110,608 to Tanimoto, et al., which the Examiner has specifically pointed to as showing "that reflowing dual Sn-Bi layers

is considered part of Tanimoto, et al.'s invention". In this experimentation, various specimens were prepared as described in Item 5 on page 2 of the Further Declaration; and solderability (wettability) tests and bond strength tests were conducted thereon, as described in Items 6 and 8, respectively bridging pages 2 and 3, and on page 4, of the enclosed Further Declaration.

The results of the solderability (wettability) tests and bond strength tests are shown respectively in Tables 1 and 2 on pages 3 and 4 and in Tables 3 and 4 on page 5, of the enclosed Further Declaration. Tables 1 and 3 respectively show solderability (wettability) and bond strength test results for specimens according to the present invention, and Tables 2 and 4 respectively show solderability (wettability) and bond strength test results using comparative specimens which, as discussed previously, fall within the scope of Tanimoto, et al.

As can be seen in the results shown in Tables 1-4 referred to previously, and as discussed in Item 10 bridging pages 5 and 6 of the enclosed Further Declaration, specimens according to the present invention have increased solderability (wettability) and increased bond strength as compared with specimens of Example 44 in Table 3 of U.S. Pat. No. 6,110,608 to Tanimoto, et al., and thus specimens according to the present invention are superior to specimens of Example 44 in Table 3 of U.S. Patent No. 6, 110,608 in solderability and bond strength. It is respectfully submitted that these test results showing improved solderability (wettability) and bond strength are unexpectedly better results, over the closest prior art, and clearly establish unobviousness of the presently claimed subject matter, particularly when taken together with the results in the aforementioned Declaration submitted June 30, 2003, even assuming, arguendo, that the teachings of Tanimoto, et al. would have established a prima

facie case of obviousness.

It is noted that in the sentence bridging pages 2 and 3 of the Office Action mailed July 21, 2003, the Examiner has referred to both Example 33 and Example 44, each in Table 3, of Tanimoto, et al. However, it is respectfully submitted that Example 44 constitutes the "closest prior art" to the present invention, from the teachings of Tanimoto, et al. Thus, Example 33 includes a first plated layer which is only tin, the second plated layer being Sn-3%Ag-7%Bi. In contrast, and as indicated by the Examiner in the Office Action mailed July 21, 2003, Example 44 has dual tin-bismuth layers, that is, a first plated layer of Sn-2%Bi and a second plated layer of Sn-10%Bi. It is respectfully submitted that Example 44 of Tanimoto, et al. is closer to the present invention than is Example 33 of Tanimoto, et al., so as to constitute the "closest prior art".

It is to be noted that in Item 10 bridging pages 5 and 6 of the Office Action mailed July 21, 2003, the Examiner has specifically referred to Example 44 in Table 3 of Tanimoto, et al., and particularly based thereon applicants have endeavored to provide comparisons in connection therewith.

The additional contention by the Examiner in Item 10 bridging pages 5 and 6 of the Office Action mailed July 21, 2003, that applicants should have used reflow conditions that are essentially the same as the reflow conditions disclosed in Tanimoto, et al., is noted. In connection therewith, the Examiner specifically refers to reflow processing conditions of Tanimoto, et al., of 750°C at 50-70 minutes. In connection therewith, the Examiner's attention is respectfully directed to Item 11 on page 6 of the enclosed Further Declaration. Thus, it is respectfully submitted that the temperature of 750°C in Tanimoto, et al., is a welding temperature, not a reflow soldering temperature; and that, in general, reflow

soldering of leads of semiconductor devices is conducted at a temperature of 200°-240°C. As set forth in this Item 11, it makes no sense to compare solder joints obtained under solder reflow conditions with those obtained under other conditions (for example, welding conditions, at 750°C).

Thus, it is respectfully submitted that the testing set forth in the enclosed Further Declaration constitutes a fair comparison with respect to reflow soldering, between the present invention and the closest prior art set forth in Tanimoto, et al.; and that this comparison clearly shows unexpectedly better results achieved according to the present invention.

The following additional remarks are set forth traversing the substance of the alleged prima facie case of obviousness by the Examiner in the Office Action mailed July 21, 2003.

Thus, in Item 6 on page 4 of the Office Action mailed July 21, 2003, the Examiner contends that one of ordinary skill in the art at the time the invention was made would have understood that the invention of Tanimoto, et al., is contemplated for lead-free alloys. This contention is respectfully traversed. In this regard, it is emphasized that the teachings of Tanimoto, et al., as a whole must be considered. This reference discloses use of plated layers on leads, which plated layers do not contain lead. However, the fact remains that, in the examples of Tanimoto, et al., a molten eutectic solder (which contains lead) is used. Taking the teachings of Tanimoto, et al. as a whole, as required under 35 USC §103, it is respectfully suggested that Tanimoto, et al. decreases amount of lead in the final structure by avoiding a lead-containing layer, but by specifically teaching use of a eutectic solder would have taught away from the lead-free layer and lead-free solder. Taking the teachings of Tanimoto, et al. as a whole, it is respectfully

suggested that this reference would have taught away from use of a lead-free solder, in combination with the plating layer on the lead, as in the present invention.

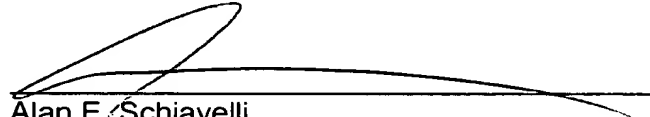
The additional contention by the Examiner that, from the statement by Tanimoto, et al., on lead-containing alloys, at column 1, lines 60-65, that it would be evident to one of ordinary skill in the art that Tanimoto, et al. clearly understands that lead-containing alloys generally should not be used and that they have been replaced by lead-free alloys in current practice, is respectfully traversed. It is noted that discussion concerning lead-free alloys in the solder is a description in connection with the background of the invention in Tanimoto, et al, with respect to solders. Tanimoto, et al., in connection with the invention described therein, goes on to use lead-containing solder together with a lead-free plating layer on the leads. Again, taking the teachings of Tanimoto, et al. as a whole, as required under 35 USC §103, it is respectfully submitted that this reference does not suggest using solder which is a lead-free alloy. It is respectfully submitted that Tanimoto, et al. as a whole would have taught away from the presently claimed subject matter, including the lead-free solder, with the lead having an Sn-Bi alloy-plating layer comprising 1-5 wt%Bi, as in the present claims.

In view of the foregoing comments and amendments, and particularly in view of the presently submitted Further Declaration, entry of the Further Declaration, and reconsideration and allowance of all claims presently in the application, are respectfully requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR §1.136. Please charge any shortage in the fees due in connection with

the filing of this paper, including extension of time fees, to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Dep. Acct. No. 01-2135 (500.38665CX1), and please credit any excess fees to such deposit account.

Respectfully submitted,
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